

HALF-YEARLY EXAMINATION 2021-22

CLASS - IX
SUB - Physics

F.M.-100
Time-2hrs

Answer to this paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.

The time given at the head of question paper is the time allowed for writing the answer

Section I is compulsory. Attempt all questions from Section I and any four from Section II

Section I (60 marks)

Attempt all question from this section.

Question. 1

- (a) State the numeric value of the frequency of oscillation of a second's pendulum. Does it depend on the amplitude of oscillation? [2]
- (b) Two simple pendulums A and B have equal lengths but their bobs weigh 50gf and 100 gf respectively. What would be the ratio of their time periods? [2]
- (c) Give an example of motion of a body moving with a variable velocity. Draw a diagram to represent such a motion. [2]
- (d) Differentiate between uniform acceleration and variable acceleration. [2]
- (e) Give an example of motion in which average speed is not zero, but average velocity is zero. [2]
- (f) Define the term 'acceleration due to gravity'. State its average value. [2]

Question. 2

- (a) A spring is compressed against a rigid wall. Draw a neat labelled diagram showing the forces acting on the spring. [2]
- (b) Define absolute units of force in C.G.S as well as SI system. [2]
- (c) State Newton's first law of motion. [2]
- (d) Two equal and opposite forces act on a moving object. How is its motion affected? Give reason. [2]
- (e) Define linear momentum and state its SI unit. [2]
- (f) Two bodies A and B of same mass are moving with velocities v and $2v$ respectively. Compare their (i) Inertia (ii) Momentum. [2]

Question. 3

- (a) State three factors on which the pressure of a point in a liquid depends. [2]

- (b) State the law of transmission of pressure in liquids. [2]
 (c) Define SI unit of Pressure. How does the pressure exerted by a solid and a fluid differ? [2]
 (d) State two advantages of an aneroid barometer over a simple barometer. [2]
 (e) How is the reading of a barometer affected when it is taken to (i) a mine (ii) a hill? [2]
 (f) Why does the liquid rise in a syringe when its piston is pulled up? [2]

Question. 4

- (a) Define upthrust and state its SI unit. [2]
 (b) A body weighs 200 gf in air and 190 gf when completely immersed in water. Calculate the up thrust on the body. [2]
 (c) Differentiate between density and relative density of a substance. [2]
 (d) State the principle of floatation. [2]
 (e) A block of wood of volume 25cm^3 floats on water with 20cm^3 of its volume immersed. Calculate (i) the density and (ii) The weight of block of wood. [4]

Question. 5

- (a) Why does a piece of ice when touched with hand appear cool? Explain. [2]
 (b) Draw a diagram showing the temperature of various layers of water in an ice covered pond. [2]
 (c) Name the SI unit of heat. How is it related to the unit calorie? [2]
 (d) How does the liquid pressure on a diver change if (i) The diver moves to the greater depth and (ii) The diver moves horizontally? [2]
 (e) Differentiate between density and relative density of a substance? [2]
 (f) It is easier to lift a heavy stone under water than in air explain. [2]

Section II (40 Marks)

Do any four questions.

Question. 6

- (a) Two identical blocks A and B of different materials float on water such that 90% of A and 15% of B remain submerged inside water. Compare (i) density of A and B (ii) upthrust of water on A and B. [4]
 (b) Explain the motion of a rocket with the help of Newton's third law.
 (c) A cube of each side 5cm is placed inside a liquid. The pressure at the centre of one face of cube is 10pa. Calculate the thrust exerted by the liquid on this face. [3]

Question. 7

- (a) A wooden block floats in water with two-third of its volume submerged. (i) Calculate the density of wood. (ii) When same block is placed in oil, three quarter of its volume is immersed in oil. Calculate the density of oil. [4]

- (b) A balloon of volume 1000 m^3 is filled with a mixture of hydrogen and helium of density 0.32 kg/m^3 . If the fabric of balloon weighs 40 kg and the density of cold air is 1.32 kg/m^3 , find the tension in the rope, which is holding the balloon to ground. [4]
- (c) A balloon filled with hydrogen rises to a certain height and then stops rising further. Give reason [2]

Question. 8

- (a) A solid body weighs 2.10 N in air. Its Relative Density is 8.4 . How much will the body weigh if placed (i) in water (ii) in a liquid of R.D 1.2 ? [4]
- (b) RD of silver is 10.5 . What is the density of silver in SI unit? [2]
- (c) A body of mass 3.5 kg displaces 1000 cm^3 of water when fully immersed inside it. Calculate (i) the volume of body. (ii) the up thrust on body and (iii) the apparent weight of body in water. [4]

Question. 9

- (a) Deduce an expression for the pressure at a depth inside a liquid. [3]
- (b) A block of iron of mass 7.5 kg and of dimension $12 \text{ cm} \times 8 \text{ cm} \times 10 \text{ cm}$ is kept on a table top on its base of side $12 \text{ cm} \times 8 \text{ cm}$. Calculate (i) thrust (ii) pressure exerted on the table top. Use $1 \text{ kgf} = 10 \text{ N}$. [4]
- (c) A dam has broader walls at the bottom than at the top. Explain. [3]

Question. 10

- (a) A train first travels for 30 min with a velocity 30 km/hr and then for 40 min with a velocity 40 km/hr in the same direction. Calculate (i) the total distance travelled (ii) the average velocity of the train. [4]
- (b) Prove $S = ut + \frac{1}{2} at^2$ using graphical method. [3]
- (c) A stone dropped from the top of a tower, takes 4 sec to reach ground level. Calculate (i) Final velocity of stone (ii) Height of the tower. Use $g = 10 \text{ m/s}^2$ [3]

Question. 11

- (a) Show that the rate of change of momentum = mass X acceleration. Under what condition does this relation hold? [3]
- (b) Draw graphs to show the dependence of (i) acceleration on force for a constant mass and (ii) force on mass for a constant acceleration. [3]
- (c) A cricket ball of mass 100 g moving with a speed of 30 m/s is brought to rest by a player in 0.03 sec . Find (i) the change in momentum of ball. (ii) the average force applied by the player. [4]